

LOUISIANA DEPARTMENT OF WILDLIFE & FISHERIES



OFFICE OF FISHERIES INLAND FISHERIES SECTION

PART VI -B

WATERBODY MANAGEMENT PLAN SERIES

BUNDICK LAKE

WATERBODY EVALUATION & RECOMMENDATIONS

CHRONOLOGY

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Bobby C. Reed, Biologist Manager, District 5

November 2012—Updated by:

Eric Shanks, Biologist Manager, District 5

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TABLE OF CONTENTS

WATERBODY EVALUATION.....	4
STRATEGY STATEMENT	4
<i>Recreational</i>	4
<i>Commercial</i>	4
<i>Species of Special Concern</i>	4
EXISTING HARVEST REGULATIONS	4
<i>Recreational</i>	4
<i>Commercial</i>	4
SPECIES EVALUATION	4
<i>Recreational</i>	4
<i>Creel Surveys</i>	15
<i>Commercial</i>	17
<i>Species of Special Concern</i>	17
HABITAT EVALUATION	17
<i>Substrate</i>	18
<i>Artificial Structure</i>	18
CONDITION IMBALANCE / PROBLEM	19
CORRECTIVE ACTION NEEDED.....	19
RECOMMENDATIONS	20
REFERENCES	21

WATERBODY EVALUATION

STRATEGY STATEMENT

Recreational

Black basses, crappies and catfishes in Bundick Lake are managed to provide anglers the greatest opportunity to catch and harvest a limit of fish. Sunfishes are managed to provide a sustainable population while providing anglers the opportunity to catch and harvest numbers of fish.

Commercial

The physical characteristics of Bundick Reservoir do not support the large rough fish species that normally comprise a commercial fishery; therefore, a commercial fishery is limited to catfish species including channel catfish (*Ictalurus punctatus*), blue catfish (*I. furcatus*), flathead catfish (*Pylodictis olivaris*), and the bullhead catfishes (*Ameiurus spp.*). The existing prohibition on commercial fishing gear follows the recreational strategy chosen for many of our popular inland reservoirs –emphasizing recreational fisheries for bass and crappies. Catfish are managed to provide a sustainable population while providing anglers and commercial fishers the opportunity to harvest numbers of fish.

Species of Special Concern

No threatened or endangered fish species are found in this waterbody.

EXISTING HARVEST REGULATIONS

Recreational

Statewide regulations for all fish species, the 2013 recreational fishing regulations may be viewed at the link below:

<http://www.wlf.louisiana.gov/fishing/regulations>

Trot lines, yo-yos, and set hooks are legal gear.

Commercial

The 2013 commercial fishing regulations may be viewed at the link below:

<http://www.wlf.louisiana.gov/fishing/regulations>

Trotlines and slat traps are the only legal commercial gears allowed for use in Bundick Lake. The use of gill nets, trammel nets, fish seines and hoop nets are prohibited as per RS 76:119.

SPECIES EVALUATION

Recreational

Black Bass

Largemouth bass

Electrofishing is the most commonly used sampling technique to assess largemouth bass relative abundance (catch per unit effort = CPUE), size distribution and relative weight (physical body condition). Data collected during spring and fall electrofishing are used to describe population trends, age composition, growth rate, mortality rate and the genetic composition of a LMB population.

Relative abundance, size distribution and relative weight-

Largemouth bass are managed with statewide length and creel limits (see above). Largemouth bass (LMB) make up over 90% of the population of black bass in Bundick Lake. Size distribution of the LMB population (length frequencies) generated from standardized sampling results show a normally distributed population structure (Figure 1), with 56% of the largemouth bass ranging between 8 and 15 inches in total length (TL).

Mean relative weight (Wr) for each inch group is also shown in Figure 1. This measurement is obtained from fall samples only and is defined as the ratio of fish weight to the weight of a “standard” fish of the same length. The Wr index is calculated by dividing the weight of a fish by the standard weight for its length, and multiplying the quotient by 100. Largemouth bass relative weights below 80 may indicate a problem of insufficient or unavailable forage; whereas relative weights closer to 100 indicate sufficient forage is available. A description of the forage species and sampling methods is described below. Mean relative weights for almost all size classes of largemouth bass from Bundick Lake are at or above the 95 value, indicating a healthy population with adequate forage.

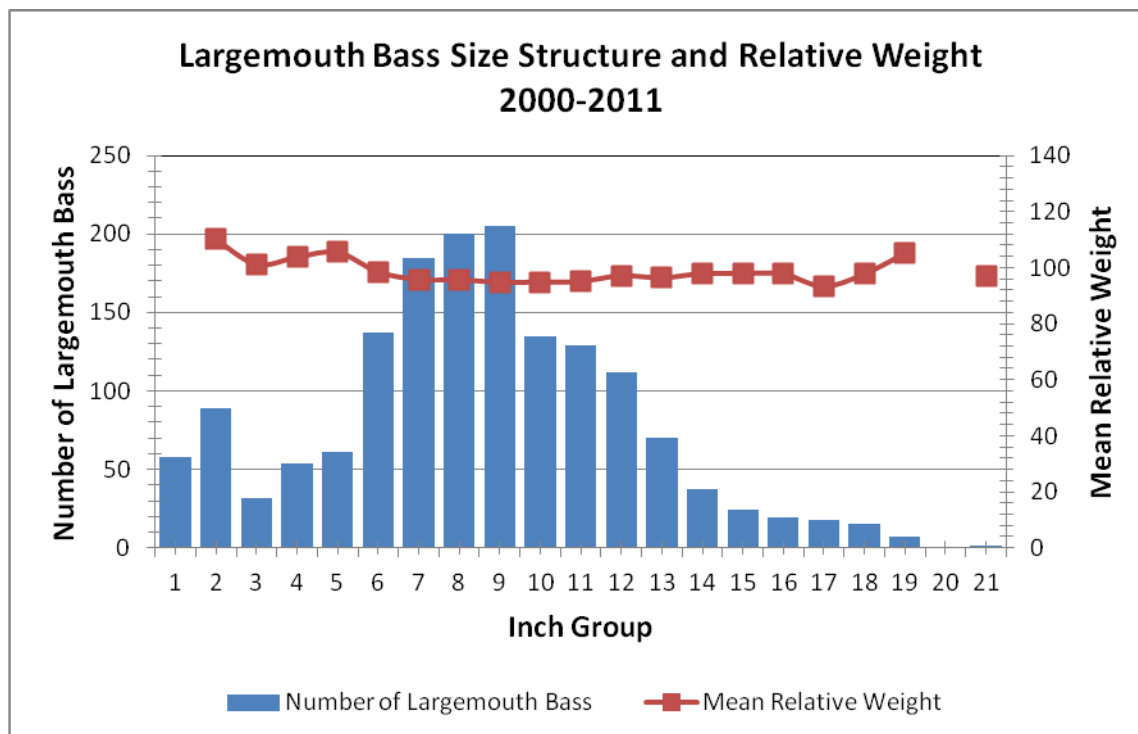


Figure 1. Largemouth bass size distribution results (length groups) generated from all gear types for all seasons, 2000 - 2011 (n=1,588). Mean relative weights by inch group calculated from fall electrofishing samples only (n=727).

Standardized electrofishing results show high variability in the fall, indicating variable annual recruitment (Figure 2). Spring catch rates are more stable, with CPUE usually ranging from 40 to 80 bass/hour (Figure 3). The CPUE of quality size (>12") fish is similar between spring and fall, with means of 16.8 and 15.5, respectively. This, along with normal relative weight factors, indicates a stable, healthy population of harvestable largemouth bass in Bundick Lake.

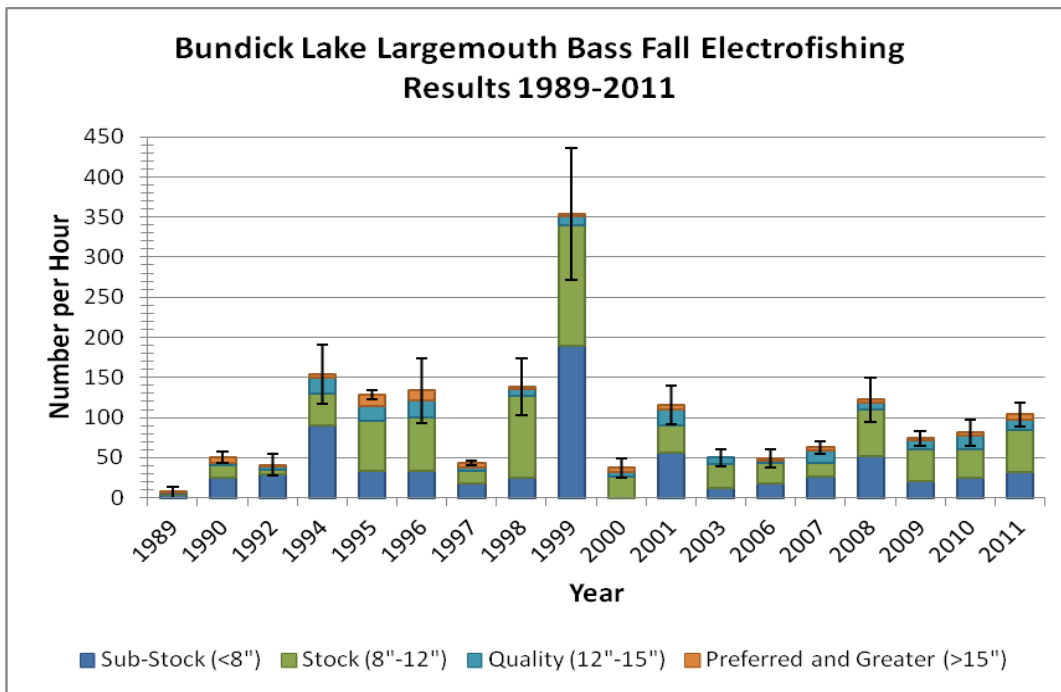


Figure 2. Mean CPUE (\pm SE) for largemouth bass by size class from standardized fall electrofishing samples for 1989-2011. Error bars represent standard error of total mean CPUE.

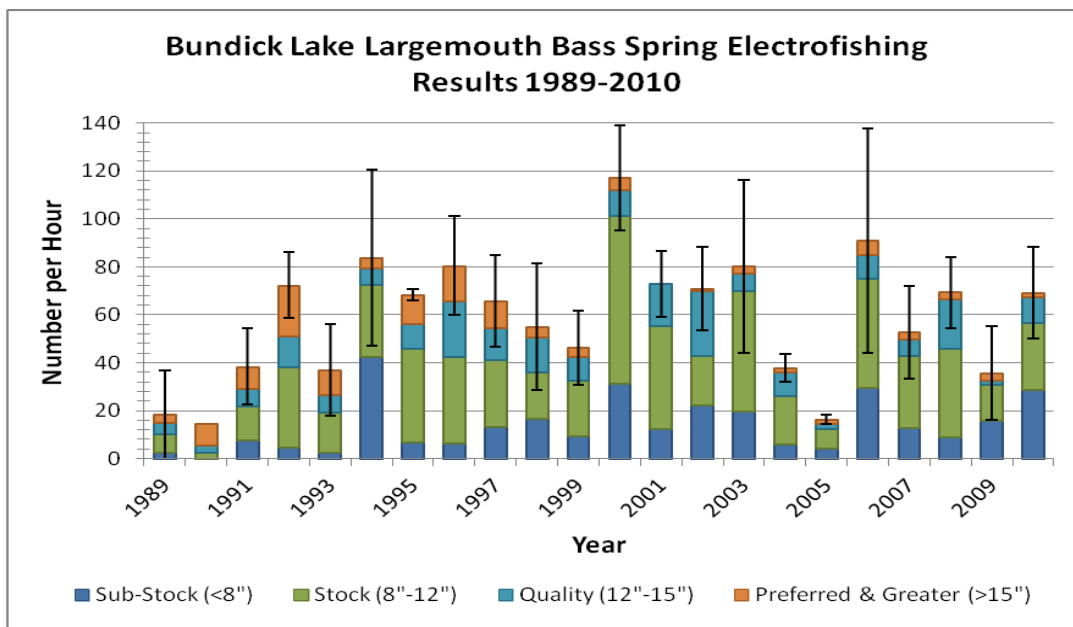


Figure 3. Mean CPUE (\pm SE) of largemouth bass by size class from standardized spring electrofishing samples for 1989-2011. Error bars represent standard error of total mean CPUE.

Size structure indices-

Proportional stock density (PSD) and relative stock density (RSD) are indices used to numerically describe length-frequency data (Anderson and Neumann 1996). Proportional stock density compares the number of fish of quality size (greater than 12 inches for largemouth bass) to the number of bass of stock size (greater than 8 inches in length), and is calculated by the formula:

$$\text{PSD} = \frac{\text{Number of bass} \geq 12 \text{ inches}}{\text{Number of bass} \geq 8 \text{ inches}} \times 100$$

PSD is expressed as a percentage. A fish population with a high PSD consists mainly of larger individuals, whereas a population with a low PSD consists mainly of smaller fish. A value between 40 and 70 generally indicates a balanced bass population. In Bundick Lake, spring PSD values do not show a great degree of variability, with the exception of 2000-2003 (Figure 4). Fall PSD values show a much greater degree of variability, which is attributable to highly variable young-of-the-year (YOY) numbers depending upon spawning success (Figures 5 and 7). From 2006-2010, mean spring and fall PSD values were very similar at 29 and 30 respectively (Figures 4 and 5). This indicates that during this recent timeframe, the LMB population is slightly out of balance with an over abundance of smaller fish.

Relative stock density (preferred, RSD_{15}) is the percentage of largemouth bass in a stock (fish over 8 inches) that are 15 inches TL or longer, and is calculated by the formula:

$$\text{RSD}_{15} = \frac{\text{Number of bass} \geq 15 \text{ inches}}{\text{Number of bass} \geq 8 \text{ inches}} \times 100$$

An RSD_{15} value between 10 and 40 indicates a balanced bass population, while values between 30 and 60 indicate a higher abundance of larger fish. RSD_{15} values in Bundick Lake range from 0 to 23, and are at or above 10 in both spring and fall electrofishing for the majority of the years sampled (Figures 4 and 5). This indicates that in most years, Bundick Lake has a balanced LMB population. The fluctuations in both PSD and RSD_{15} values may be attributable to variable spawning success resulting in variable year class strength.

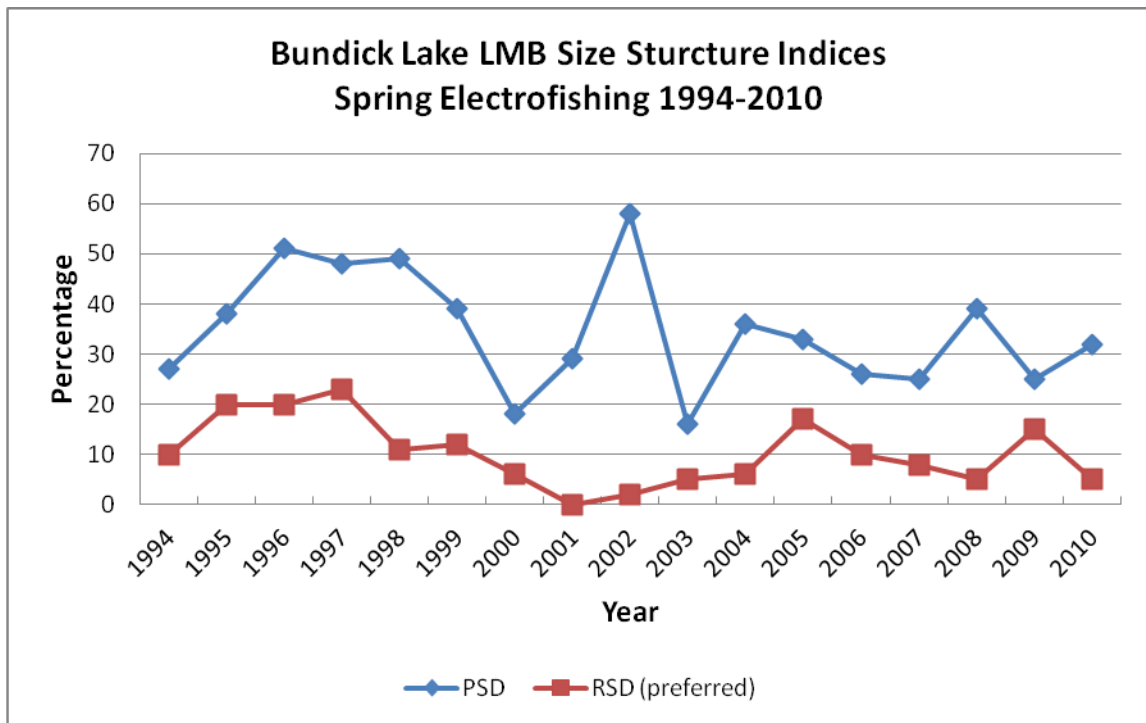


Figure 4. Proportional stock density and relative stock density (preferred) for largemouth bass on Bundick Lake, LA from spring electrofishing results, 1994 – 2010.

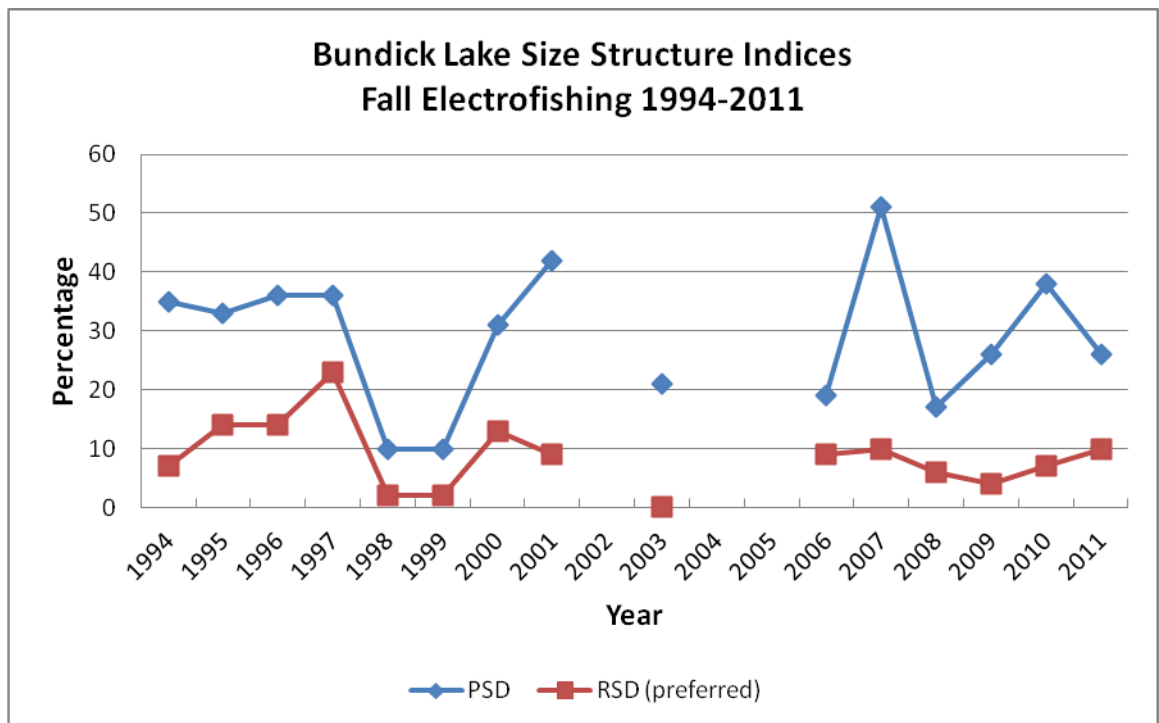


Figure 5. Proportional stock density and relative stock density (preferred) for largemouth bass on Bundick Lake, LA from fall electrofishing results, 1994 – 2011.

Age and growth-

The LMB growth rates in Bundick Lake match average Louisiana statewide growth rates to age 1, then slightly exceed the state average for ages 2,3, and 5 (Figure 6). No age 4 fish have been collected in fall age and growth sampling on Bundick Lake. This missing age class and deviations from the statewide mean are probably the result of small sample size. Future sampling plans include conducting the standardized age, growth, and mortality project that will involve larger sample sizes and more accurately reflect growth rates in the lake.

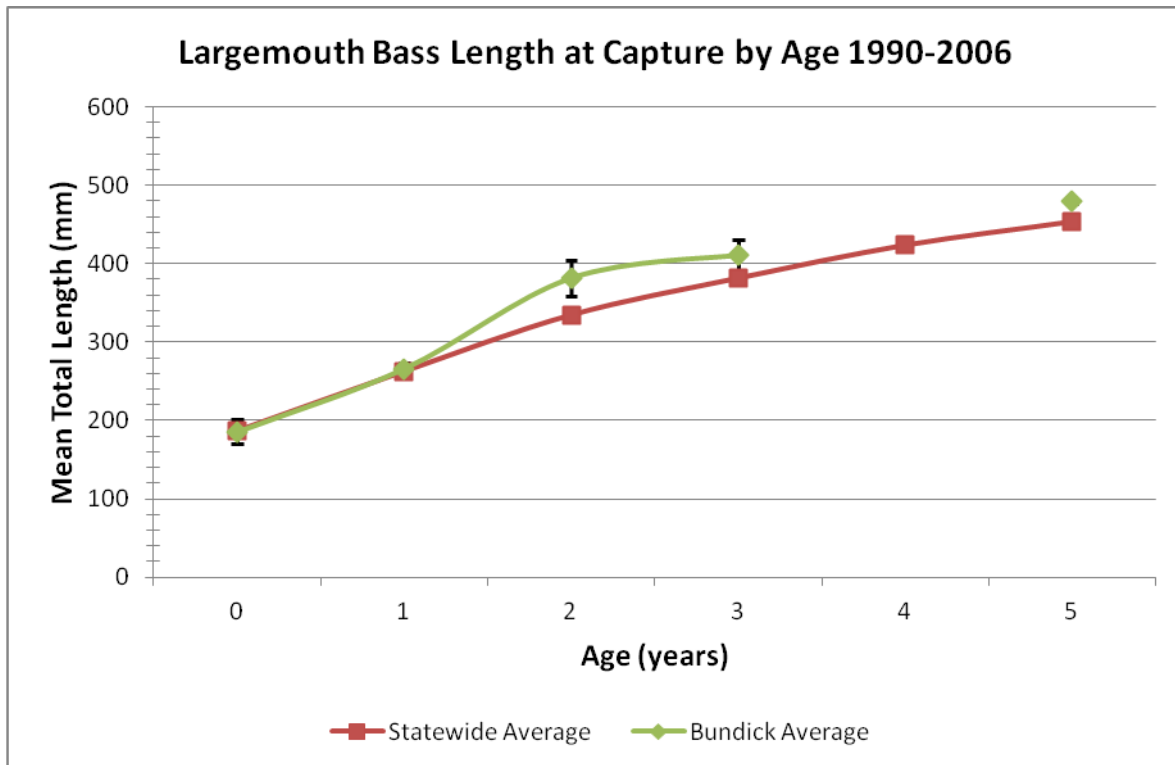


Figure 6. Largemouth bass mean length at capture by age (\pm 95% CI) for 1990-2006, from standardized fall electrofishing samples (n=82).

Largemouth bass reproduction-

Largemouth bass reproduction based on seine haul captures of YOY was stable from 1989-1998, but mean catch-per-seine haul (CPUE) was lower than the subsequent decade; 2000-2010 (mean CPUE 3.3 and 5.4 respectively, Figure 7). While mean CPUE was higher in 2000-2010, variability was also higher, indicating fluctuating spawning success in this time period.

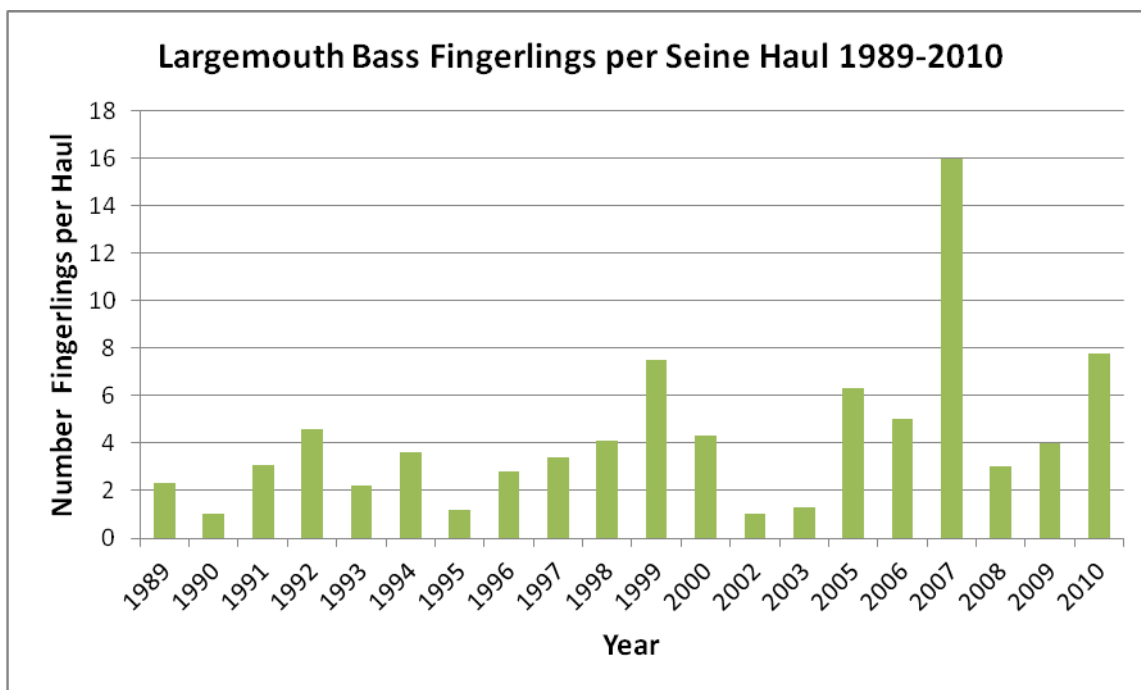


Figure 7. Number of largemouth bass fingerlings captured per seine haul from Bundick Lake, LA, for 1989-2010.

Largemouth bass genetics-

Genetic analyses through electrophoresis of liver tissues from largemouth bass show 10% or greater Florida influence from 2003-2009 (Table 1). The most recent stocking of approximately 43,000 Florida largemouth bass (FLMB) occurred in 2005. This degree of gene introgression and persistence from relatively small FLMB stockings (122,375 all years combined) indicates Bundick Lake may have good potential to establish a significant amount of the Florida genome.

Table 1. Genetic analysis of largemouth bass from Bundick Lake, LA for 1988-2009.

Year	Number	Northern	Florida	Hybrid	Florida Influence
1988	30	94.4%	0%	6.6%	6.6%
2003	31	81%	0%	19%	19%
2006	41	90%	0%	10%	10%
2008	50	88%	2%	10%	12%
2009	53	81%	0%	19%	19%

Spotted bass

Spotted bass comprise 5% to 10% of the total population of black bass found in Bundick Lake. They are found most commonly in the lower reaches of the reservoir along the face of the dam, where the predominant habitat is gravel and rip-rap.

Forage and Biomass

According to standardized electrofishing forage samples, the most commonly available forage for largemouth bass in Bundick Lake are *Lepomis spp.*, primarily bluegill (*Lepomis macrochirus*) and longear (*L. microlophus*) sunfish (Figure 8). *Dorosoma spp.*, both, threadfin (*Dorosoma petenense*) and gizzard shad (*D. cepedianum*), are also important forage items whose relative abundance varies greatly. This variance may be a result of sampling bias more than actual abundance since LDWF forage sampling is not specifically designed to capture shad species. Other forage species include bullhead minnows (*Pimephales spp.*), freshwater silversides (*Labidesthes sicculus*), blacktail shiners (*Cyprinella venusta*), and golden shiners (*Notemigonus crysoleucas*).

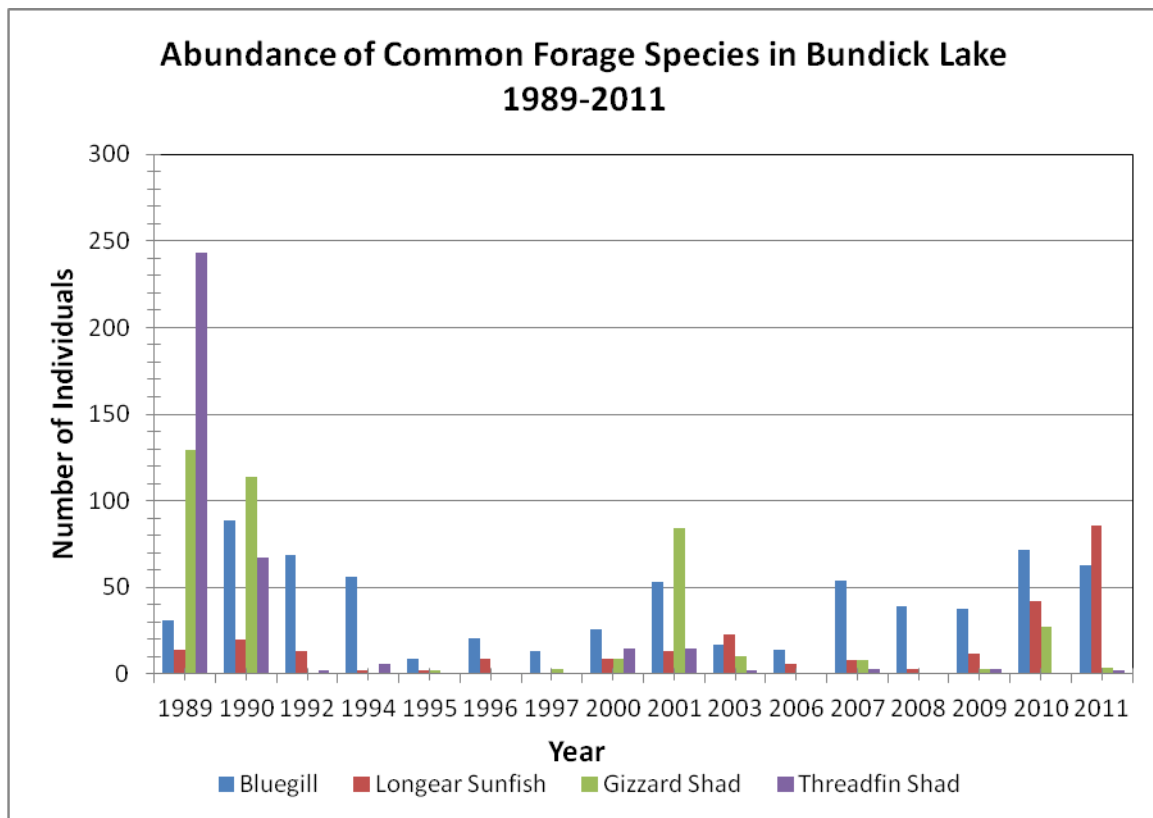


Figure 8. Number of bluegill, longear sunfish, gizzard shad, and threadfin shad less than 6 inches TL captured in standardized fall forage samples on Bundick Lake, LA, from 1989-2011.

Mean total standing crop of fish in Bundick Lake from 1966 until 1993 was 189 lbs. /acre (Figure 9). Peak production years for the total standing crop was in 1974 (375 lbs/acre) and 1980 (315 lbs/acre). Best overall game fish production was observed in 1979 (160 lbs. /acre). From 1981 to 1993 there was a downward trend in total standing crop which may be attributable to reduced productivity as the lake ages.

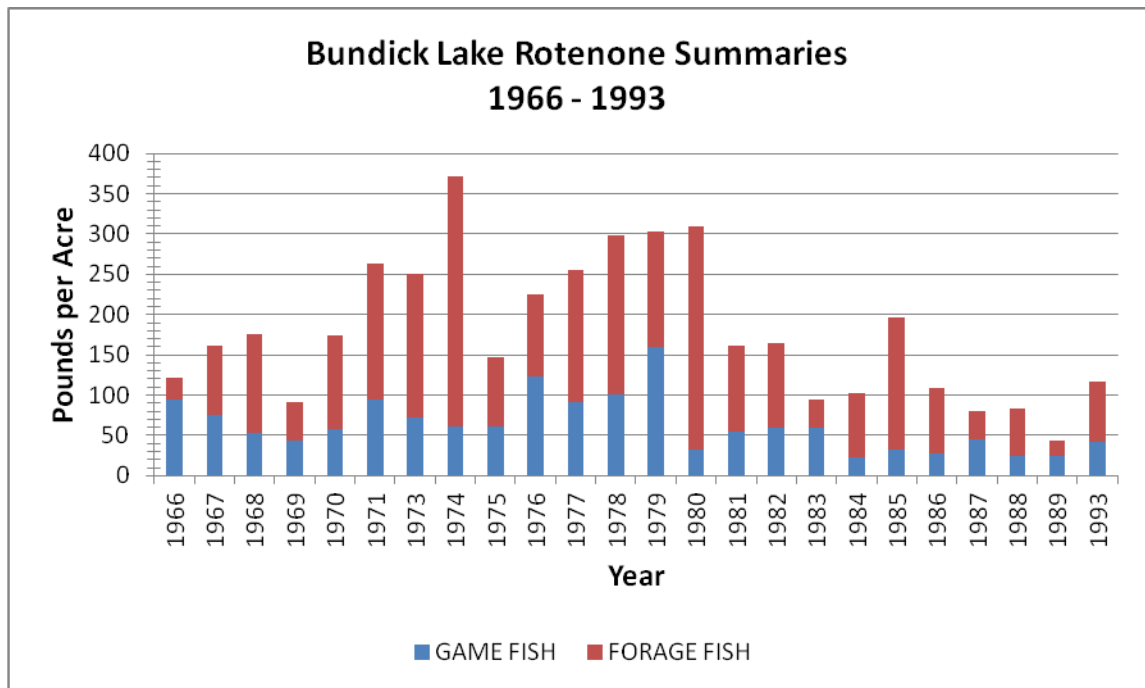


Figure 9. Standing crop estimates (biomass) in pounds per acre for game fish and forage species on Bundick Lake, LA, from 1966 to 1993.

Crappie

Both white crappie and black crappie are common in Bundick Lake. Standardized lead net samples in 2006 show the white crappie population to be more abundant (Figure 10). There are two distinct peaks in the white crappie size distribution at 7" and 12" TL. This may be attributable to variable growth rates (Figure 11), a strong 2005 year class, harvest of these 9"-10" fish by crappie anglers (Figure 12), or a combination of all three. It is also possible this variation may be related to small sample size.

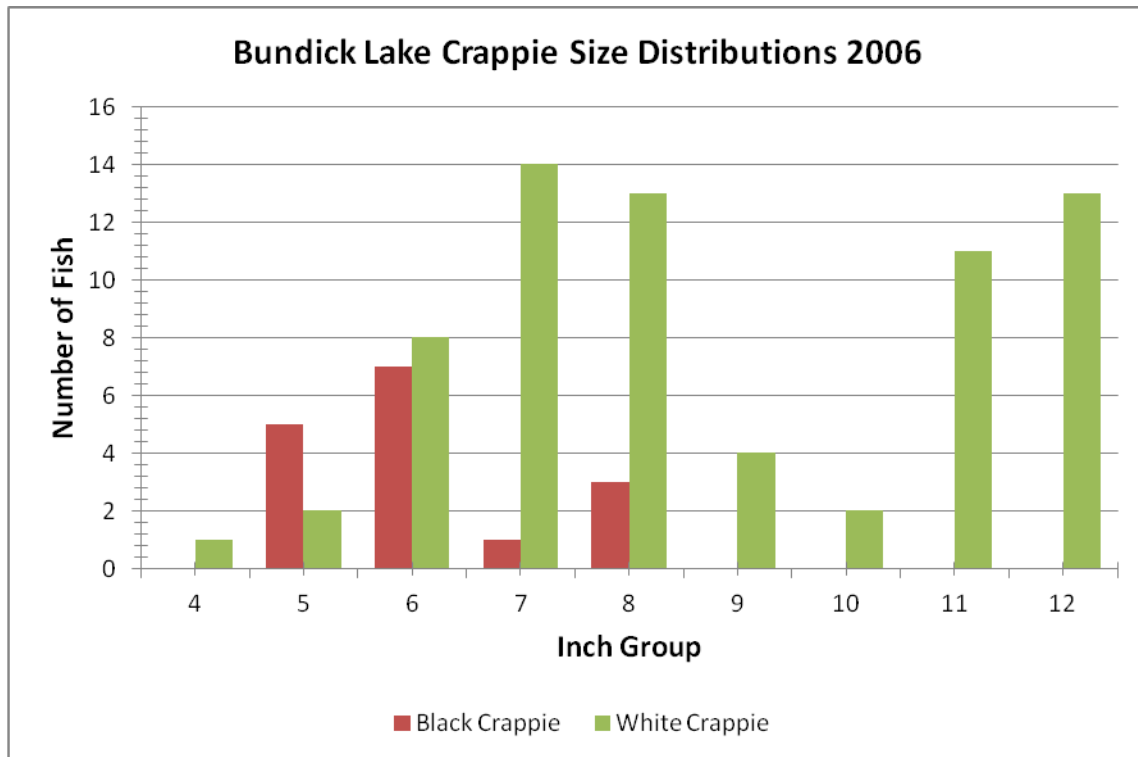


Figure 10. Size distributions (inch groups) for black crappie and white crappie from Bundick Lake, LA; generated from standardized lead net results for 2006 (n=84).

Crappie age and growth analysis indicates white crappie reach 10" TL in 2.1 years on average (Figure 11). Individual crappie in Bundick Lake show variable growth rates with 1.5 year old fish ranging in size from 6 to 10 inches. Growth rates slow dramatically by age 4. The majority of fish sampled for age and growth analysis were captured by lead nets. Age 0+ crappie is not represented due to size selectivity of the gear. Black crappie were not analyzed due to small sample size (n=11) in 2006. A standardized crappie population assessment is being conducted from 2012 to 2015. Results of the study are projected to be available after 2015.

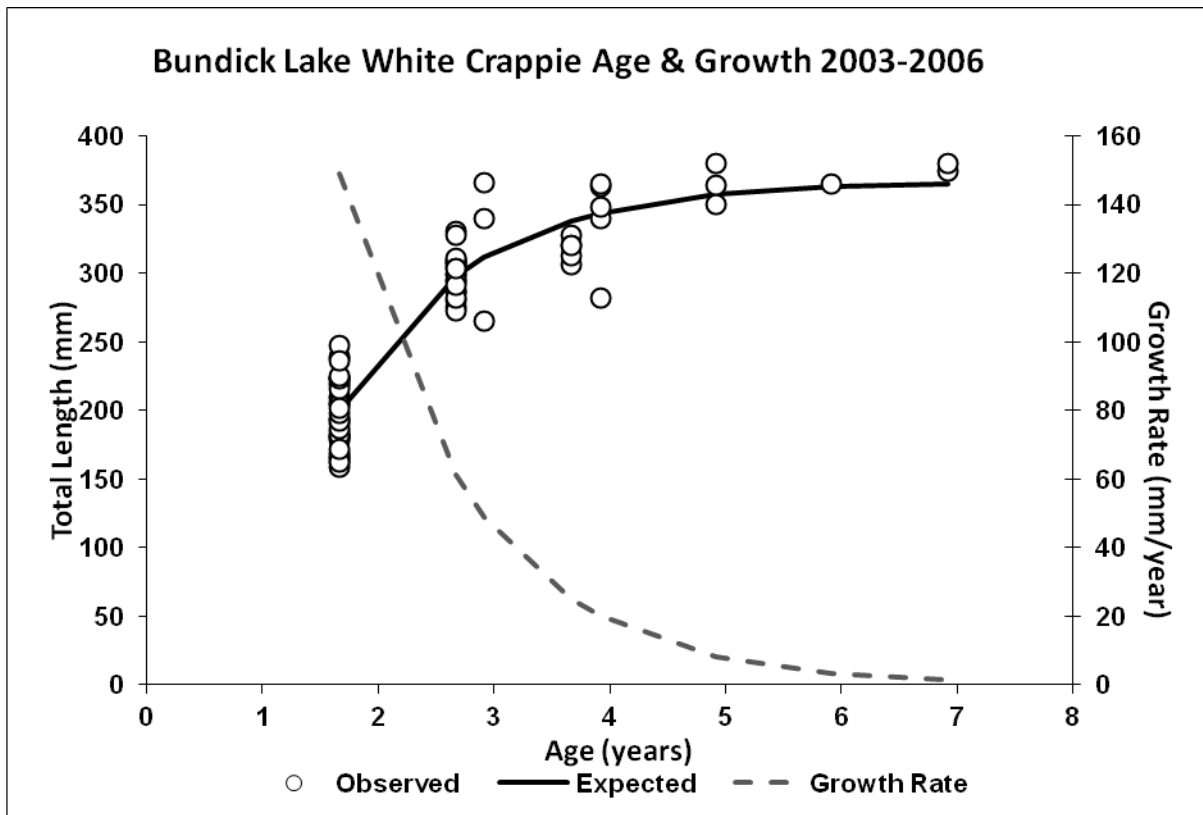


Figure 11. Von Bertalanffy growth model for white crappie from 2003 and 2006, lead nets and gill nets combined (N=79).

Creel Surveys

Results of the 2002 creel survey indicate that fishing trips were from 3.0 to 4.5 hours in duration, with 5,344 anglers traveling 18 to 23 miles to fish the reservoir (Table 2). Largemouth bass anglers harvested 52.6% of their catch, with most of the released fish (71.5%) falling below 12" TL (Table 3).

Largemouth bass anglers

Creel survey data from the 2002 creel survey shows a total angler effort of 17,658 hours with bass anglers expending the most effort (6,393 hours), followed by non-specific anglers (6,104 hours) and crappie anglers (4,512 hours). Even utilizing the total angler effort on 1,500 acres of bass habitat (11.8 hours/acre), there is not enough fishing pressure for a size regulation on LMB to have a significant effect given the fisheries estimate of 30 angler hours/acre found in Eder (1984). When utilizing only bass angler effort, this number drops even lower (4.3 hours/acre). Since bass anglers harvest the most LMB (Table 4), the lower number of 4.3 hours/acre is the more appropriate estimate to use. This indicates that the current black bass regulation (no MLL) is the appropriate size regulation on Bundick Lake.

Table 2. Total angler number, averages of angler party size, duration of fishing trip, and distance traveled from residence to boat ramp from 2002 creel survey.

Target Species	Total Number of anglers	Mean Number of anglers in party	Mean length of fishing trip (hrs.)	Mean one-way distance traveled to ramp
Anything	2154	2.12	4.20	23
Largemouth Bass	1937	1.89	3.46	17
Crappie	1253	1.84	3.09	18

Table 3. 2002 data for largemouth bass caught per trip, released per trip, harvested per trip, and mean weight of harvested bass for non-specific and bass anglers.

Target Species	Number LMB caught per trip	Number LMB released per trip	Number LMB harvested per trip	Average weight (lbs.) of harvested LMB
Anything	0.09	0.04	0.01	0.76
Largemouth Bass	1.69	0.57	1.12	1.18

Table 4. Total largemouth bass harvested, released, released below, and released above 12 inches by largemouth bass anglers in 2002.

Target Species	Total Number LMB harvested	Total Number LMB released	Number LMB released below 12"	Number LMB released above 12"
Largemouth Bass	2313	1186	848	376

Crappie anglers

Bundick Lake 2002 creel data indicates peak crappie fishing occurs November through February, with very few anglers targeting crappie outside of this timeframe. The majority of crappie harvested (64.5%) were between 8" and 11" (Figure 10) and averaged 0.65 lbs. (Table 5). All creel estimates, charts, and figures are for black and white crappie species combined.

Table 5. Total crappie harvested, number harvested per trip, and average weight of crappie harvested by crappie anglers in 2002.

Target Species	Total Number Crappie harvested	Number Crappie harvested per trip	Average weight of harvested Crappie (lbs.)
Crappie	4214	2.48	0.65

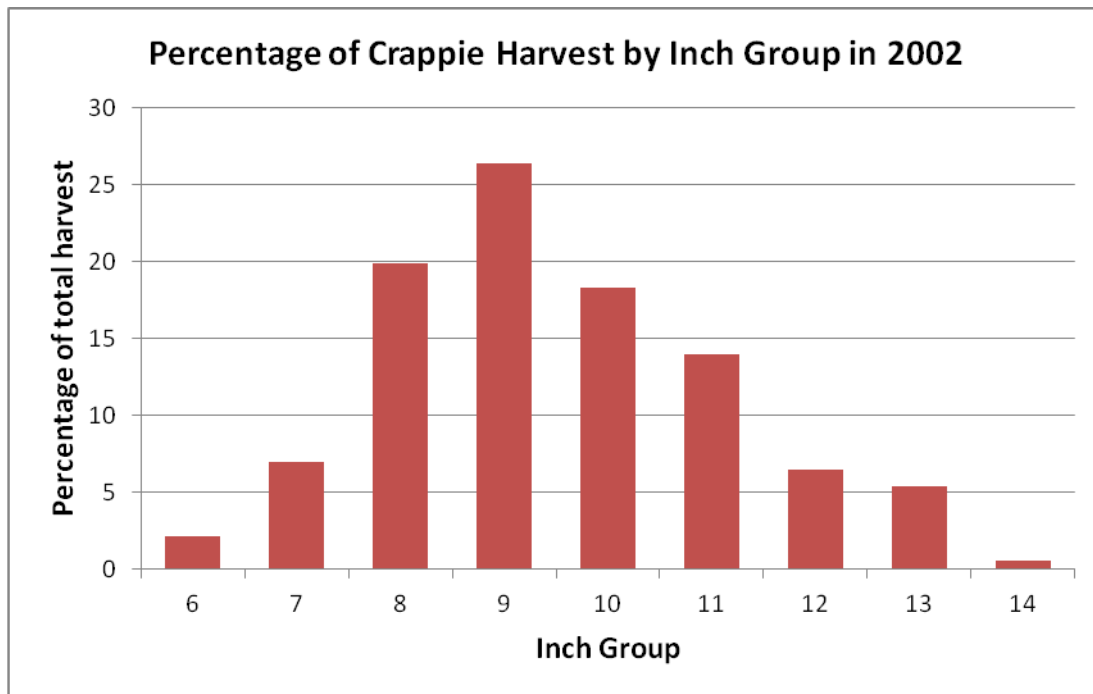


Figure 12. Size distribution (per inch group) of crappie harvested on Bundick Lake, LA, from 2002 creel results (n=186).

Commercial

Trotlines and slat traps are the only legal commercial gears allowed for use in Bundick Lake:

Channel catfish – 11 inch minimum length limit (10% may be undersized)

Blue catfish – 12 inch minimum length limit (5% may be undersized)

Flathead catfish – 14 inch minimum length limit (5% may be undersized)

Species of Special Concern

Sabine shiner – *Notropis sabinae*

HABITAT EVALUATION

Fish Spawning Habitat-

Bundick Lake has a predominately sandy bottom with little accumulation of silts and organic materials in most of the lake. Because of this, centrarchids and crappie have abundant available spawning area. The abundance of inundated and fallen riparian timber also provides cavity nesters (catfishes) with sufficient areas for reproduction. Spawning habitat is not a limiting factor in Bundick Lake.

Juvenile fish habitat-

Submersed aquatic vegetation (SAV) abundance varies greatly from north to south in Bundick Lake. The northern third of the lake has abundant cover consisting of coontail

(*Ceratophyllum demersum*), spatterdock (*Nuphar luteum*), and stonewort (*Nitella spp.*) as well as less beneficial vegetation such as alligatorweed (*Alternanthera philoxeroides*), water hyacinth (*Eichhornia crassipes*), and common salvinia (*Salvinia minima*). The southern 2/3 of the lake has much less beneficial juvenile cover, however stonewort is found commonly along the 2'-4' contour interspersed with coontail (2010 Vegetative Type Map, Part A). Spatterdock is found along most of the shoreline of the lake, and combined with the above mentioned SAV help to provide beneficial cover to juvenile centrarchids around much of the lake. With varying abundance, juvenile cover can sometimes be a limiting factor, however as of 2010, Bundick has had above 10% beneficial aquatic plant coverage for all species combined.

Adult fish habitat-

Because Bundick is a relatively shallow lake, most of the lake is utilized by adult fish of all species. A thermocline is seldom present due to shallow water and wind action. Adult habitat is not a limiting factor and approximately 86% (1,500 acres) is considered bass habitat.

Water fertility-

Overall fertility has declined since inundation due to the natural aging process of the reservoir. This has been detrimental to overall fisheries production by reducing primary productivity, but beneficial in reducing overall abundance of nuisance aquatic vegetation, particularly water hyacinth. While the "new reservoir effect" is now gone, Bundick lake remains a productive fishery with abundant fish populations of all species available for utilization by anglers.

Problem vegetation-

Common salvinia is the predominant nuisance aquatic vegetation on the lake. Its abundance varies by season with coverage in some years reaching up to 70% of the lake surface. Alligatorweed is also common and can block access to some areas of the lake. Peruvian water grass is a recent introduction (2006) that grows in thick mats and can choke out shallow coves. All of these plants negatively impact habitat and are detrimental to fisheries in the lake. Recent use of newer chemicals (imazapyr and imazamox), along with shallow water boats (Pro-Drives[®]) have enabled LDWF crews to access and reduce overall abundance of these nuisance species. In areas where problem plants had taken over and were the predominant species, we now see more beneficial plants such as spatterdock and coontail.

Substrate

Bottom substrates of Bundick Lake consist primarily of hard packed river sand interspersed with clay banks and Asiatic clams, an aquatic invasive species found here.

Artificial Structure

Many of the artificial structures found in Bundick Lake consist of wharves, piers, and duck blinds. Often private property owners will place brush tops and Christmas trees adjacent to shorelines and piers as fish attractants. The LDWF District 5 crews in conjunction with the Bundick Lake Improvement Association placed seven tire reefs

around the lake in 1992. Originally marked with buoys, the reefs provided several good years of fishing to recreational anglers before the buoys tore free and the exact locations temporarily lost. The GPS coordinate locations of the reefs will be established during the next drawdown.

CONDITION IMBALANCE / PROBLEM

The northern end of Bundick Lake is susceptible to overgrowth of nuisance aquatic vegetation. Additionally, due to its large watershed and the natural life span of reservoirs, the lake has become shallower in this same area over time. The northern end is particularly affected as sediments carried by the creek fall out of suspension with reduced water velocity.

CORRECTIVE ACTION NEEDED

Continue to work diligently to control invasive aquatic plant species.
Reduce sedimentation.

RECOMMENDATIONS

- 1) Work with DEQ to identify sources of sediment runoff to improve water clarity in the lake.
- 2) Identify and stabilize exposed soil areas that may be sources of non-point sediment runoff (turbidity, i.e.), initiate best management practices for existing and future shoreline development, bridge crossings, gravel roads and drive-ways, and clear-cutting forestry practices.
- 3) Annual type mapping of aquatic vegetation on Bundick Lake will continue, while spray crews will conduct herbicide applications on nuisance plants, such as water hyacinth, alligatorweed, Peruvian water grass and common salvinia as needed in areas that impede public access.
- 4) Conduct fisheries stock assessments including a mortality project for LMB, crappie and sunfish populations utilizing standardized sampling techniques.
- 5) Work with state and local agencies to replace the existing control structure with one of modern technology and materials which would provide easy operation and maintenance in order to execute planned management drawdowns.
- 6) Develop and implement a five year drawdown rotation schedule for shoreline maintenance. Work with parish government and LADOTD during these drawdowns to maintain/rebuild existing infrastructure (ramps, spillway, and piers) as needed.
- 7) Locate and establish GPS coordinate for tire reefs and mark with buoys during the next draw down.

REFERENCES

- Eder S. 1984. Effectiveness of an imposed slot length limit of 12.0 to 14.9 inches on largemouth bass. *North American Journal of Fisheries Management* 4:469-478.
- Anderson, R. O., and R. M. Neumann. 1996. Length, weight, and associated structural indices. Pages 447-482 in B. R. Murphy and D. W. Willis, editors. *Fisheries techniques*, 2nd edition. American Fisheries Society, Bethesda, Maryland.